CHAPTER 2
ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.0 INTRODUCTION
This Chapter describes the alternatives developed to address the issues, presents a comparison of the alternative features and a summary of the effects that would result from implementing each alternative. Section 2.2 presents these alternatives in detail.

2.1 DEVELOPMENT OF ALTERNATIVES
Alternatives present different management options in response to the purpose and need for the proposed action and address the relevant major issues related to the proposed action. The effects analysis then describes the known or potential effects that would result from implementing each Alternative.

Alternative A, the No Action Alternative, represents a continuation of the existing situation where no private or federal wells and associated infrastructure would be approved. The POD proposed by Powder River Gas would be denied in its entirety and the landscape would not be altered.

Alternative B, No Federal Action Alternative, reflects an action where federal wells would not be approved in the Powder River Gas proposed POD. The private wells and associated infrastructure would be developed in the project area, as they do not require BLM authorization. This alternative complies with the Montana Board of Oil and Gas Conservation Order No. 99-99. The general order applies to coal bed methane wells drilled on private and state land in the Powder River Basin Controlled Groundwater Area as established by the Department of Natural Resources and Conservation. It does not apply to lands owned by Indian Tribes or held in trust by the United States for Indian Tribes or individual Indians.

Alternative C consists of the proposed project plan of development submitted by Powder River Gas on both the federal minerals and the private CBNG development. Alternative C is the preferred alternative.

2.2 DESCRIPTION OF THE ALTERNATIVES
Alternative A, the No Action Alternative, represents a continuation of the existing situation where MDEQ, MBOGC and the BLM would not approve any of the Proposed Action. Alternative B analyzes the private wells and infrastructure found in the Coal Creek POD. Finally, Alternative C consists of the Proposed Action, Project Plan of Development, submitted by Powder River Gas. For a detailed comparison of the major components for the three alternatives, see Table 2.5-1. A detailed description of the alternatives follows.

2.2.1 Alternative A—No Action
Neither the MDEQ, MBOGC nor the BLM would approve actions the private and federal wells in the POD. None of the wells would be drilled and tested, nor would any of the associated infrastructure be constructed. The entire Powder River Gas, Coal Creek POD would be denied and not take place at any level.

2.2.2 Alternative B—No Federal Action
There would be no BLM approved actions and none of the federal wells in the POD would be drilled and tested. However, the proposed private wells would continue to be drilled and tested for CBNG resources in the project area. This alternative would include 8 private CBNG wells with 80 acre well density. The eight private wells would be drilled on 4 locations to test the Flowers-Goodale and Wall coal zones (see Appendix A).

Project map 1.3-2 shows the project boundaries, existing and proposed wells, access roads, pipelines (water and gas), power lines, a central gathering/metering/water processing facility with water storage pit (loop facility), and a water discharge point in the POD area.

All of the wells and associated infrastructure would be located on private surface. The road and pipeline routes are proposed as agreed to by the appropriate private surface owner. Where possible, whether proposed two-track road or existing, the roads would serve as a common corridor for the gas, electric or water.

Typically there is no need for earthwork prior to preparing a drilling location. Each well location would have a 25 feet wide x 40 feet long reserve pit for the disposal of cuttings. Pit closure would occur after the evaporation of the fluids. The reserve pits would be fenced on three sides and the fourth would be fenced after the drilling rig has moved off of the location.

CBNG potential would be determined on the eight proposed private wells and two existing private wells, by pumping groundwater from the coal seams, thereby reducing hydrostatic pressure and causing the methane to become desorbed from the coal surface and flow to the wells. Produced gas would be vented approximately 10 feet from ground level. In areas where there is a safety concern or a possible ignition source, the gas would be flared. Testing would last no longer than 6 weeks and not exceed 30,000 cubic feet per day per well. After testing, the gas would be shut off, groundwater pumping would cease, and gas pressures would be monitored.

Water produced from the CBNG wells would be treated at a loop facility prior to discharging it directly into the Tongue River at one discharge point. The Higgins Loop treatment facility, 200 feet wide x 200 feet long in size, would receive produced effluent from the CBNG wells into one of two pit chambers. Each of the two pit chambers would measure 125 feet long, 62.5 feet wide, containing approximately 0.5 acre-feet per chamber. The entire structure would be lined with a 12 mil polyethylene liner to insure no transmission of produced effluent to ground water occurs. Once the effluent has settled in the chamber, the product would enter the Higgins Loop for the treatment process. As a product of the treatment process, effluent becomes acidic; it would then enter a pH stabilization facility. Once the pH has been stabilized using limestone, the effluent would then temporarily enter the remaining pit chamber prior to discharge into the Tongue River. In the event of an emergency and the Higgins Loop facility was to shut down, the second pit chamber would be utilized for effluent containment. The operator has proposed a variety of potential beneficial uses for the treated water. These include wildlife, livestock, irrigation, and industrial uses.

The primary objective in treating CBNG produced effluent is removal of sodium (Na^{+}) in order to reduce SAR levels. In addition, some situations may require the removal of barium and other heavier cations in order to meet MPDES discharge requirements. A strong acid cation exchange resin is used to scavenge the cations from the water as it is passed through the Higgins Loop. The cations are replaced by hydronium ions from resin beads. The hydronium ions are released in the treated water, which lowers the pH of the water. This will allow the bicarbonate ions in the water to react with the hydonium ions to form carbon dioxide gas. The treated water is then discharged to a neutralizing bed where excess hydronium ions and residual bicarbonate ions can react with selected calcium to achieve the desired pH. Note that neutralizing agents other than calcium may be used should the need arise.

Concurrent with the sodium and other cation loading that is taking place in the absorber section of the Loop, cations are stripped from the resin in the regeneration section. Dilute hydrochloric acid is injected into the loop and moves counter-current to the resin to the spent brine discharge, leaving the resin restored to the hydronium form. Concentrated brine volumes average approximately 1.0% of the total Loop feed volume, depending on the cation loading that is removed from the treated water. Excess brine that is not recycled to other beneficial uses will be transported offsite by truck for disposal injection into a Class One, deep disposal well located in Wyoming. The waste stream from the treatment process, at maximum flow, will generate approximately 60 barrels of brine or reject water per day. Note, that these disposal wells are permitted and approved by all state, local and federal regulatory agencies. Precautionary measures will be taken to ensure safe transport of brine from the facility to the disposal well. Especially when transporting adjacent to water bodies of the State. During periods of adverse weather and driving conditions, transportation efforts may be suspended until more favorable conditions exist. In the event of an accidental spill, all pertinent governing agencies will be immediately notified.

No production facility, compressor or other infrastructure for the production of CBNG is proposed. After testing is completed, the sites would be shut-in.

Reclamation of the surface would begin after construction is completed. Completion of reclamation would occur within one year (or sooner) of the construction (depending on the weather). The disturbed areas would be disked and seeded with a weed-seed free mix approved by the Natural Resource Conservation Service and the surface owner. Powder River Gas proposes to do the reseeding in the fall of 2004.

For a detailed description of design features, construction practices and water management strategies associated with the no federal action alternative, refer to the Master Surface Use Plan, Drilling Plan and Water Management Plan in the POD and individual APDs. More information on CBNG well drilling, production and standard practices is also available in the MT FEIS.

Additionally, the Operator has committed to:

- Comply with all applicable Federal, State and Local laws and regulations
- Obtain the necessary permits for the drilling and testing the wells
- Provide water well agreements to the owners of record for permitted water wells within the area of influence of the action
- Provide water analysis from a designated reference well in each coal zone

2.2.3 Alternative C—Proposed Action

Powder River Gas proposes 16 CBNG wells with 80 acre well density in the Coal Creek Project Plan of Development (POD). Eight federal wells would be drilled at 4 locations and 8 private wells would be drilled on 4 locations to test the Flowers-Goodale and Wall coal zones (see Appendix A).

Project map 1.3-2 shows the project boundaries, existing and proposed wells, access roads, pipelines (water and gas), power lines, a central gathering/metering/water processing facility with water storage pit (loop facility), and a water discharge point in the POD area.

All of the wells and associated infrastructure are proposed on private surface. The road and pipeline routes are proposed as agreed to by the appropriate private surface owner. Where possible, whether proposed two-track road or existing, the roads would serve as a common corridor for the gas, electric, or water.

At 7 of the 8 sites, no earthwork would be needed to prepare the proposed drilling locations. Each drilling location would have a 25 foot wide x 40 foot long reserve pit for the disposal of cuttings. At one of the federal drilling locations (11-6), pad construction would be needed prior to drilling. Pit closure would occur after the evaporation of the fluids. The reserve pits would be fenced on three sides and the fourth would be fenced after the drilling rig has moved off of the location.

CBNG potential would be determined on the 16 proposed federal and private wells and two existing private wells, by pumping groundwater from the coal seams, thereby reducing hydrostatic pressure and causing the methane to become desorbed from the coal surface and flow to the wells. Produced gas would be vented approximately 10 feet from ground level. In areas where there is a safety concern or a possible ignition source, the gas would be flared. Testing would last no longer than 6 weeks and not exceed 30,000 cubic feet per day per well. After testing, the gas would be shut off, groundwater pumping would cease, and gas pressures would be monitored.

Water produced from the CBNG wells would be treated at a loop facility prior to discharging it directly into the Tongue River at one discharge point. The Higgins Loop treatment facility, 200 feet wide x 200 feet long in size, would receive produced effluent from the CBNG wells into one of two pit chambers. Each of the two pit chambers would measure 125 feet long, 62.5 feet wide, containing approximately 0.5 acre-feet per chamber. The entire structure would be lined with a 12 mil polyethylene liner to insure no transmission of produced effluent to ground water occurs. Once the effluent has settled in the chamber, the product would enter the Higgins Loop for the treatment process. As a product of the treatment process, effluent becomes acidic; it would then enter a pH stabilization facility. Once the pH has been stabilized using limestone, the effluent would then temporarily enter the remaining pit chamber prior to discharge into the Tongue River. In the event of an emergency and the Higgins Loop facility was to shut down, the second pit chamber would be utilized for effluent containment. The operator has proposed a variety of potential beneficial uses for the treated water. These include wildlife, livestock, irrigation, and industrial uses.

The primary objective in treating CBNG produced effluent is removal of sodium (Na^+) in order to reduce SAR levels. In addition, some situations may require the removal of barium and other heavier cations in order to meet MPDES discharge requirements. A strong acid cation exchange resin is used to scavenge the cations from the water as it is passed through the Higgins Loop. The cations are replaced by hydronium ions from resin beads. The hydronium ions are released in the treated water, which lowers the pH of the water. This will allow the bicarbonate ions in the water to react with the hydonium ions to form carbon dioxide gas. The treated water is then discharged to a neutralizing bed where excess hydronium ions and residual bicarbonate ions can react with selected calcium to achieve the desired pH. Note that neutralizing agents other than calcium may be used should the need arise.

Concurrent with the sodium and other cation loading that is taking place in the absorber section of the Loop, cations are stripped from the resin in the regeneration section. Dilute hydrochloric acid is injected into the loop and moves counter-current to the resin to the spent brine discharge, leaving the resin restored to the hydronium form. Concentrated brine volumes average approximately 1.0% of the total Loop feed volume, depending on the cation loading that is removed from the treated water. Excess brine that is not recycled to other beneficial uses will be transported offsite by truck for disposal injection into a Class One, deep disposal well located in Wyoming. The waste stream from the treatment process, at maximum flow, will generate approximately 60 barrels of brine or reject water per day. Note, that these disposal wells are permitted and approved by all state, local and federal regulatory agencies. Precautionary measures will be taken to ensure safe transport of brine from the facility to the disposal well. Especially when transporting adjacent to water bodies of the State. During periods of adverse weather and driving conditions, transportation efforts may be suspended until more favorable conditions exist. In the event of an accidental spill, all pertinent governing agencies will be immediately notified.

No production facility, compressor or other infrastructure for the production of CBNG is proposed. After testing is completed, the wells would be shut-in.

Reclamation of the surface would begin after construction is completed. Completion of reclamation would occur within one year (or sooner) of the construction (depending on the weather). The disturbed areas would be disked and seeded with a weed-seed free mix approved by the Natural Resource Conservation Service and the surface owner. Powder River Gas proposes to do the reseeding in the fall of 2004.

For a detailed description of design features, construction practices and water management strategies associated with the proposed action, refer to the Master Surface Use Plan, Drilling Plan and Water Management Plan in the POD and individual APDs. More information on CBNG well drilling, production and standard practices is also available in the MT FEIS.

Additionally, the Operator has committed to:

- Comply with all applicable Federal, State and Local laws and regulations
- Obtain the necessary permits for the drilling and testing the wells
- Provide water well agreements to the owners of record for permitted water wells within the area of influence of the action
- Provide water analysis from a designated reference well in each coal zone

2.3 RELEVANT CUMULATIVE ACTIONS

The MT FEIS analyzed the long-term cumulative effects of CBNG activity throughout the region in combination with other reasonably foreseeable future activities. This planning level analysis was based on the best information available at the time using predictions on the level of CBNG development. The analysis disclosed the general types of effects to be considered in more detail during the review of site-specific CBNG proposals such as Powder River Gas' POD.

While there are many past, present and reasonably foreseeable actions occurring throughout the area, only a few are relevant to the cumulative effects assessment for the Powder River Gas POD. The actions are considered relevant if they have the potential to create effects overlapping in time and locale with the proposed action effects or alternatives, thus resulting in cumulative effects.

In order to assess the potential for cumulative effects from Powder River Gas's proposed POD, the following past, present and reasonably foreseeable future actions have been identified. The actions are considered relevant if they have the potential to contribute to the cumulative effects. Cumulative effects are presented in Chapter 4 for each alternative.

2.3.1 Relevant Past Actions

Decker Coal Mine

The Decker Mine is a surface coal mine owned jointly by the Kiewit Company and Kennecott Energy Company and operated by Decker Coal Company, a Kiewit subsidiary. The East Decker Mine is located approximately five miles southwest of the Powder River Gas POD area. The mining method consists of open pit strip mining. Overburden and interburden are removed by draglines, shovels and trucks, front-end loaders and trucks or dozers. The permitted mine operations area is approximately 11,400 surface acres. The average annual coal production is 10 million short tons.

Spring Creek Coal Mine

The Spring Creek Mine is a surface coal mine owned and operated by Spring Creek Coal Company. The mine is located approximately five miles southwest of the Powder River Gas POD area. The mining method consists of open pit strip mining. Overburden and interburden are removed by draglines, shovels and trucks, front-end loaders and trucks or dozers. The permitted mine operations area is approximately 7,000 surface acres. The average annual coal production is 11 million short tons.

Absaloka Coal Mine

The Absaloka Mine is a surface coal mine located on the Crow Reservation, owned and operated by Westmoreland Resources. The mine is located approximately thirty five miles northwest of the Powder River Gas POD area. The mining method consists of open pit strip mining. Overburden and interburden are removed by draglines, shovels and trucks, front-end loaders and trucks or dozers. The permitted mine operations area is approximately 5,500 surface acres. The average annual coal production is 6.8-8 million short tons.

CBNG Development

According to the Montana Board of Oil and Gas Conservation website, June 29, 2004, approximately 495 CBNG wells have been drilled in Big Horn County; approximately 98 wells or less than 20% were Federal wells. These wells range in status from spudded, producing through abandonment. Currently 449 CBNG wells, all in Big Horn County, are considered to be in production. This development is primarily found in the CX Field, near Decker, Montana.

The CX Field is a CBNG producing field approved by MBOGC and operated by Fidelity Exploration & Production Company, a subsidiary of MDU Resources. The field encompasses approximately 56 sections between the Montana/Wyoming state line and the Decker and Spring Creek coal mines. The existing CBNG producing wells are located approximately 7 miles south of the Powder River Gas – Coal Creek POD. The CBNG wells in the CX Field are finished in the D1, D2, D3, Monarch and Carney coal seams.

Conventional Oil and Gas Development

A total of 1,991 conventional oil and gas wells have been drilled in Big Horn and Rosebud counties, approximately 22% are federal or Indian wells.

2.3.2 Relevant Present Actions

CX Field

The CX Field is a CBNG producing field approved by MBOGC and operated by Fidelity Exploration & Production Company, a subsidiary of MDU Resources. The field encompasses approximately 56 sections between the Montana/Wyoming state line and the Decker and Spring Creek coal mines. The existing CBNG producing wells are located approximately 7 miles south of the Powder River Gas – Coal Creek POD. The CBNG wells in the CX Field are finished in the D1, D2, D3, Monarch and Carney coal seams.

Gravel/Scoria Pits
In the proximity of the Powder River Gas – Coal Creek POD, numerous gravel and scoria pits are located on both federal and private surface, with federal and private mineral ownership. The primary use of gravel/scoria in this area is for surfacing the access roads on both Spring Creek and Decker Mines. These mines have utilized both private and federal gravel/scoria minerals during their years of development and expansion.

Wyoming CBNG
According to the Wyoming Board of Oil and Gas Conservation website, June 29, 2004, 18,910 CBNG wells have been drilled in the state. These wells range in status from spudded, producing through abandonment. Generally, the State of Wyoming CBNG development has occurred since the early 1990's, most located in the Powder River Basin of north central/eastern Wyoming. The CBNG development is primarily located between the cities of Gillette and Sheridan.

2.3.3 Relevant Reasonably Foreseeable Actions

The BLM 1985 Powder River RMP/EIS as amended by the MT FEIS contains Reasonably Foreseeable Development and Reasonable Foreseeable Future Actions scenarios. The scenarios prepared for the amendment estimated that approximately 26,000 federal CBNG wells would be drilled throughout the life of the plan (page MIN-29). Two private CBNG wells have been drilled in the proposed project area. The 16 proposed wells analyzed in this document are part of the 26,000 wells predicted in the MT FEIS.

A total of 844 conventional oil and gas wells have been drilled in Big Horn County. Approximately 28% are federal or Indian wells. The MT FEIS predicts that an additional 200 conventional oil and gas wells would be drilled in Big Horn County in the next 20 years.

This EA analyzes the drilling of 16 wells. Even if all the proposed wells were producers, they would represent a small increase (less than 3 percent) over the estimated 449 existing CBNG production wells found in Big Horn County.

Future rate of CBNG drilling:

RFD/RFFA area	Number of wells predicted in the next 20 years	Number of wells drilled to date *
Statewide	26,000 wells	509
County (BH, RB) area**	3,500-9,800 wells	495

*Numbers produced from the Montana Board of Oil and Gas Conservation website, June 29, 2004
**BH = Big Horn, RB = Rosebud

We anticipate that future CBNG drill sites would most likely be in proximity to established production, or would offset dry holes that enable improved interpretation of the structural geology.

The 16 proposed wells are counted as part of the 3,500 - 9,800 wells predicted in the MT FEIS.

Plugged and abandoned wells, and subsequent reclamation of sites, are reasonably foreseeable. The ratio of future well abandonment to future drilling was predicted in the MT FEIS (page MIN-29). It is predicted that of the 26,000 wells drilled, approximately 2,600 wells would be dry holes in the next 20 years (10%). Therefore, it is predicted that as a result of the proposed project, 1 - 2 wells would be a dry hole.

CX Field
Additional wells could be drilled and produced within the CX Field. MBOGC has established well spacing rules for the field, which allows for four wells pre coal seam per 160 acres, with the exception of Sections 26 and 35, T. 9 S., R. 40 E. and Sections 9, 10 and 20, T. 9 S. R. 41 E., which allows for 16 wells per coal seam per 640 acres.

CX Field (Dry Creek Proposal)
Fidelity has submitted a proposal for the drilling and producing of an additional 38 CBNG wells, and the constructing and installing of the associated infrastructure in an area of the CX Field. This proposed project area is immediately west of existing production in the CX field. The proposal shows 24 federal wells, 11 state wells and 3 private wells would be drilled on 16 well sites with 1 to 4 wells drilled on each site. These CBNG wells would be completed in the D1, D2, D3, Monarch and Carney coal seams.

CX Field (Fidelity - Coal Creek Proposal)
Fidelity has submitted a proposal to MBOGC and the BLM for the drilling and producing of an additional 217 CBNG wells, and the constructing and installing of the associated infrastructure in the Coal Creek area of the CX Field. This proposed project area is immediately east of existing Badger Hills production in the field. The proposal shows 144 federal wells, 16 state wells and 62 private wells would be drilled on 47 well sites with 1 to 5 wells drilled on each site. These CBNG wells would be completed in the D1, D2, D3, Monarch and Carney coal seams.

CX Field (Pond Creek Proposal)
Fidelity has disclosed an upcoming POD submittal called the Pond Creek Project Plan of Development. Although the details of the project are unknown, the general proposal is the drilling and producing of additional CBNG wells, and the constructing and installing of the associated infrastructure in an area of the CX Field. The tentative project area is immediately north and west of existing production in the CX field.

CX Field (Deer Creek Proposal)
Fidelity has disclosed an upcoming POD submittal called the Deer Creek Project Plan of Development. Although the details of the project are unknown, the general proposal is the drilling and producing of additional CBNG wells, and the constructing and installing of the associated infrastructure in an area of the CX Field. The tentative project area is immediately north and east of existing production in the CX field.

Yates Petroleum (Exploration Project)
Yates Petroleum has submitted applications to BLM for the drilling and testing of 14 wildcat CBNG wells scattered across an area from 10 miles west and 6 miles north of the Powder River Gas POD area. The proposal shows 1 well would be drilled at each well site, with 640 acre spacing.

Powder River Gas (Coal Creek Production)
Upon successful completion of the testing, Powder River Gas may propose a POD facility location. It is anticipated that an additional 14 well locations would be developed (28 wells) based on the 80-acre spacing in the POD area. Produced gas would be marketed to a gas utility company's pipeline system.

Wolf Mountain Coal, Inc.
Wolf Mountain Coal, Inc. proposes to build a coal processing plant on private land for retail sales of coal in Lot 1, Section 18, T. 8 S., R. 40 E.; BLM recently issued them a right-of-way (MTM93074) for a power line across Federal surface in the NE¼SE¼, Section 13, T. 8 S., R. 39 E., to provide power to the proposed site.

2.4 ASSUMPTIONS FOR THE ANALYSIS
Certain assumptions are used for analysis purposes. The assumptions are based upon information in the Proposed Project description, the MT FEIS, historical data and professional experience. Assumptions used in the analysis of the Alternatives in Chapter 2 include:

Access	
Two Track Trails:	12 feet wide
Bladed Route:	12 feet wide
All Weather Road:	12 feet wide travel surface, 25 feet wide crown and ditched
Well Sites	
Drilling:	1 acre disturbed
Production:	¼ acre disturbed, remaining disturbance reclaimed
Wells:	2 wells per site with 80 acre well density

Flowlines/Power Lines

Low pressure gas:	15 feet wide disturbed
Water:	15 feet wide disturbed
Buried power:	15 feet wide disturbed

2.5 COMPARISON OF ALTERNATIVES

Table 2.5-1 compares the major components of the three alternatives. Table 2.5-2 compares the major effects identified in Chapter 4 from each of the alternatives.

Table 2.5-1. Powder River Gas Coal Creek Project--Comparison of Alternatives

Project Component	Alternative A – No Action	Alternative B – No Federal Action	Alternative C – Proposed Action
Number and land status of CBNG wells	2 existing private CBNG wells on 1 private surface location.	2 existing private CBNG wells on 1 private surface location. 8 new private CBNG wells on 4 private surface locations.	2 existing private CBNG wells on 1 private surface location. 8 new private CBNG wells on 4 private surface locations. 8 new federal CBNG wells on 4 private surface locations.
Drill hole construction	No drill hole construction.	8 private CBNG wells would be drilled with portable, truck mounted, water well drilling rigs to depths of approximately 250 feet to 1,500 feet. Air and fresh water (including coal seam water) would be used in drilling, supplemented as needed by bentonite and sawdust or wood chips. Steel casing would be cemented in place from ground surface to the top of the target coal seam. The casing would be sized to accommodate a downhole pump to lift water, but would typically be seven inches in diameter. The well would then be drilled to the base of the target coal and under reamed to increase the exposed coal surface for production. A diverter would be installed to control uphole pressures and a minimum of three centralizers would be installed on the production casing spaced to protect shallow coals and aquifers.	16 private and federal CBNG wells would be drilled in the same manner as described in Alternative B.
Disposal of wastes	No waste would be generated.	The 8 private CBNG wells at 4 locations would have a 25 feet x 40 feet reserve pit for the disposal of drill cuttings, water, drilling mud and excess cement. The reserve pits would be fenced on three sides and the fourth would be fenced after the drilling rig has moved off of the location. Upon evaporation of fluids, pit closure occurs with the back fill of soil and its compaction to prevent settling. This would occur within 90 days of the drilling and completion of the well. Excess brine transported and injected into a Class One, deep disposal well located in	14 private and federal CBNG wells at 7 locations would be managed in the same manner as described in Alternative B. 2 wells at one well location (11-6) would require construction of a drilling pad. Disturbance associated at this site after reclamation is estimated at 0.5 acres.

Project Component	Alternative A – No Action	Alternative B – No Federal Action	Alternative C – Proposed Action
		Wyoming, approved by all state, local and federal regulatory agencies. The waste stream from the treatment process, at maximum flow, will generate approximately 60 barrels of brine or reject water per day. Total temporary disturbance per location is estimated at 1 acre, ¼ acre remaining after reclamation. Garbage would be taken off site and disposed of properly. Chemical "porta-potties" would be used during active construction.	
Corridors for Gas & Water Pipelines & Electrical Lines	None constructed	Approximately .9 mile for private, 15 feet corridor. Buried plastic flowline to carry gas from each well of the 8 proposed wells and 2 existing wells to the battery site. Multiple flowlines would be placed in same trench. Trenches would parallel roads to extent feasible. No gas, water and electric line are located outside of road corridors, roughly 100 ft. of water line is located outside of the general corridors near the outfall, and 0 miles of electric line outside of road, gas and water corridors would be installed. Produced water would be transported through buried plastic flowlines from each well site to the Higgins loop water treatment facility. From the treatment facility the water would be transported through buried plastic flow line to a discharge point adjacent to the Tongue River. The outfall structure would consist of a rock riprap plunge pool lined with an anti-erosion fabric. An energy dissipation device would be installed to decrease erosion potential.	Approximately 3.1 miles (2.2 miles for federal, .9 mile for private, 15 feet corridor). Buried plastic flowline to carry gas from each well of the 16 proposed wells and 2 existing wells to the battery site. Multiple flowlines would be placed in same trench. Trenches would parallel roads to extent feasible. Gas, water and electricity would be managed as described in Alternative B, except that a total of around .2 miles of gas, water and electric line are located outside of road corridors, roughly 100 ft. of water line is located outside of the general corridors near the outfall, and 0 miles of electric line outside of road, gas and water corridors would be installed.

Project Component	Alternative A – No Action	Alternative B – No Federal Action	Alternative C – Proposed Action
		Electricity would be brought into the project area from an existing line in the southeastern portion of the POD. All buried electrical cables would be installed inside of the road, gas and water corridors. These underground lines would tie into the existing aerial power lines at service taps.	
Road maintenance and use	Road maintenance and use would be that of the current situation.	Access would primarily use roughly .3 mile of existing and .1 mile of new two track trails to access private wells, 12 feet corridor, plus 1.25 miles of all weather, county road. Earthen materials would come from adjacent locations owned by the landowner. Scoria would be used when necessary from permitted shale pits for fill material. Approximately .5 miles of existing roads (25 feet corridor) would be upgraded to all weather conditions to access the water treatment facility. Estimated use of access would be 6 vehicles per day during the 12 day drilling and testing period.	Access would primarily use approximately 6 miles of existing and new two track trails (5.6 (1.4 new) miles to access federal, .4 (.1 new) miles to access private wells, 12 feet corridor) plus 1.25 miles of all weather, county road. There would be 11 low water crossings along with 2 crossings that may need culverts. Earthen materials would come from adjacent locations owned by the landowner. Scoria would be used when necessary from permitted shale pits for fill material. Approximately .5 miles of existing roads (25 feet corridor) would be upgraded to all weather conditions to access the water treatment facility. Estimated use of access would be 6 vehicles per day, during the 12 day drilling and testing period.
MPDES Discharge of Produced Water	No water would be produced or discharged.	Total treated discharge to the Tongue River from the POD area would be 250 gpm for up to six weeks	Total treated discharge to the Tongue River from the POD area would be 450 gpm for up to six weeks
Reclamation Measures	No action would require reclamation.	The surface would be reclaimed in accordance with the agreements with landowners. The disturbed areas would be seeded with a certified seed mix agreed to by the NRCS and the surface owner.	The surface would be reclaimed in accordance with the agreements with landowners. The disturbed areas would be seeded with a certified seed mix agreed to by the NRCS and the surface owner.
Reclamation Timeframes	No action would require	Reclamation would take place within 1 year	Reclamation would take place within 1 year

Project Component	Alternative A – No Action	Alternative B – No Federal Action	Alternative C – Proposed Action
	reclamation.	where specific surface disturbing activities have been completed, and concurrent with other operations in the project area.	where specific surface disturbing activities have been completed, and concurrent with other operations in the project area.
Air Quality Monitoring	No effects	Per MDEQ Requirements	Per MDEQ Requirements
Wildlife Monitoring	None required	None required	Monitoring of specific wildlife species is required: • Big game crucial winter range • Raptor nest productivity (including bald eagle) • Bald eagle winter roosts • Sage and sharp-tailed grouse activity
Soils Monitoring	None required	Sites would be monitored during various stages of development and reclamation to ensure accelerated erosion is not occurring.	Same as Alternative B.
Water Quality	None required	Per MDEQ MPDES requirements	Same as Alternative B.

Table 2.5-2. Powder River Gas – Coal Creek Plan of Development—Summary Comparison of Effects

Affected Resource & Effect Indicators	Existing Resource Conditions	Alternative A – No Action	Alternative B – No Federal Action	Alternative C – Proposed Action
Air Quality:				
Pollutant concentrations	Comply with MAAQS/NAAQS (ARM 17.8, Subshapter 2); Request a permit determination from MDEQ for drilling rig and flaring operations and apply for and receive a MAQP prior to commencing activity, as applicable.	Emissions would increase from Alternative B to Alternative C because additional wells would be drilled under each respective alternative. The same requirements that are applicable under the existing resource conditions would apply under each alternative. However, if MDEQ makes a determination that a MAQP is required for a certain activity, compliance with the conditions and/or limitations that would be outlined in the MAQP would also be required.		
Visibility	Opacity Limitation - (ARM 17.8.304); Reasonable Precautions (ARM 17.8.308).			
Atmospheric Deposition	Comply with MAAQS/NAAQS (ARM 17.8, Subshapter 2); Request a permit determination from MDEQ for drilling rig and flaring operations and apply for and receive a MAQP prior to commencing activity, as applicable.			
Cultural Resources:				
National Register listed or eligible sites	No sites listed on the National Register exist within the POD Boundary. The isolates found	There would be no impact to cultural resources by CBNG developments. The cultural resource identified in the inventory for the project would still be vulnerable to	No sites would be affected by the proposed developments on private surface/private minerals. Otherwise impacts would be similar to those listed in Alternative A.	One prehistoric site located during the inventory of the proposed action was recommended as not eligible for listing on the National Register. The Site is away from any proposed disturbance and

Affected Resource & Effect Indicators	Existing Resource Conditions	Alternative A – No Action	Alternative B – No Federal Action	Alternative C – Proposed Action
	during the inventory are not considered eligible for listing on the National Register of Historic Places. Several nearby sites, such as the Tongue River Dam have been determined to be eligible for listing on the National Register of Historic Places.	development impacts not related to energy developments and buried cultural resources would be vulnerable to impacts caused by buried power lines and pipelines.		would not be impacted by any of the wells and associated infrastructure. The six isolates found in the project are not eligible for listing on the National Register.
Areas of traditional cultural value	The Ethnographic Overview for Southeast Montana identifies several locations in the Tongue River Canyon as potentially sensitive cultural areas to the Crow, Northern Cheyenne, and Sioux Tribes. Sensitive areas include ceremonial areas, plant collection locales, and battle sites. A spring is identified between wells 5-6F and 11-6F. This is a sensitive site type identified in the Crow and Northern Cheyenne Technical Reports and the Southeast Montana Ethnographic Overview. BLM does not anticipate either	There would be no development so there would be no impact to cultural resources from this development. These areas would still be vulnerable to impact from other non-energy related developments.	The areas identified in existing resource conditions could vulnerable to impacts caused by developments of the wells on private surface/private minerals. The MBOGC would be apprised of the results of any inventory for TCPs to incorporate this into well plans.	BLM would conduct field visits with affected tribes to determine if TCPS exist within the POD boundaries or would be affected by the POD. Measures would be developed to mitigate impacts.

Affected Resource & Effect Indicators	Existing Resource Conditions	Alternative A – No Action	Alternative B – No Federal Action	Alternative C – Proposed Action
	well impacting the spring.			
Geology and Minerals:				
CBNG Development	The target coal seams are the Flowers-Goodale from 1,109 feet to 1,462 feet and the Wall at 201 feet to 551 feet. Four federal and four private wells are planned for the Flowers-Goodale coal and four federal and four private wells are planned for the Wall coal. One private well in each of the two coal seams are currently drilled and located in the SWNW, Section 7, location 5-7 of the Coal Creek POD.	With no drilling and development on these private and federal leases, there would be no gas produced from leases. There would be no effect on the coal formations under the leases.	Under Alternative B only the private wells would be drilled and tested for short period of time but not produced. During testing of these wells, small volumes of gas would be lost through venting. Coal formations would be partially dewatered and small volumes of gas would be removed.	Under the proposed action the wells would be drilled and tested for short period of time but not produced. During testing of these wells, small volumes of gas would be lost through venting. Coal formations would be partially dewatered and small volumes of gas would be removed.
Hydrology:				
Water Quality Direct Impacts:				
Max LMM SAR at Birney Day School	1.23	1.23	1.23	1.23
Max LMM EC at Birney Day School (µS/cm)	735	735	736	738
Water Quality Cumulative Impacts:				
Max LMM SAR at Birney Day School	1.23	1.21	1.22	1.23
Max LMM EC at Birney Day School (µS/cm)	735	727	730	733
Water Quantity Direct Impacts:				

Affected Resource & Effect Indicators	Existing Resource Conditions	Alternative A – No Action	Alternative B – No Federal Action	Alternative C – Proposed Action
Max discharge rate to Tongue River	0 gpm	0 gpm	250 gpm	450 gpm
Max LMM Flow at Birney Day School (cfs)	176.6	176.6	177.1	177.6
Radius of 20' Drawdown Contour (with 6 weeks of pumping)	none	none	.36 miles	.48 miles
# of domestic or stock wells within the 20' drawdown area (with 6 weeks of pumping) and potentially completed in the produced coal seams	0	0	0	0
# of springs within the 20' drawdown area (with 6 weeks of pumping) which emit from the produced coal seams	0	0	0	0
Water Quantity Cumulative Impacts:				
Max LMM Flow at Birney Day School (cfs)	176.6	180.4	181.8	182.9
Radius of 20' Drawdown Contour (with 20 years of pumping)	none	none	3.6 miles	4.7 miles
# of domestic or stock wells within the 20' drawdown area (with 20 years of pumping) and potentially completed in the produced coal seams	0	0	1	1
# of springs within the 20' drawdown area (with 20 years of pumping) which emit from the produced coal seams	0	0	0	0
Indian Trust and Native American Concerns:				

Affected Resource & Effect Indicators	Existing Resource Conditions	Alternative A – No Action	Alternative B – No Federal Action	Alternative C – Proposed Action
Indian Trust Assets	No Native American owned lands or leases are present within the project area. Based on an October 15th, 2003 meeting with the BLM, the Northern Cheyenne Tribe expressed the following concerns Impacts to Water Quality in the Tongue River, Impacts to Tribal Class I Air Quality, Impacts to Cultural Resources, and impacts to Wildlife Migration Corridors.	There would be no impact to Indian Trust Assets.	There would be no impact to Indian Trust Assets managed by the Federal Government. The concerns expressed in the existing resource conditions would exist for developments on private surface. Impacts to the concerns raised by the Northern Cheyenne Tribe would be addressed in the appropriate section of the EA.	Impacts would be similar to Alternative B. However, BLM would be required under the principles of Trust Management, to ensure that the Northern Cheyenne Air Quality is not degraded and water quality in the Tongue River is not impaired for the proposed development. Impacts to the concerns raised by the Northern Cheyenne are addressed in the Chapters 3 and 4 of this EA.
Livestock Grazing:				
Livestock Operations	Three landowners/lessees in the project area running approximate 250 to 300 cow/calf pairs. Water is a limiting factor in livestock operations.	Same as existing resource conditions.	Produced water may create opportunities for additional water sources and livestock operations may benefit.	Same as Alternative B.
Social and Economic Conditions:				

Affected Resource & Effect Indicators	Existing Resource Conditions	Alternative A – No Action	Alternative B – No Federal Action	Alternative C – Proposed Action
Federal production and Royalties	MBOGC report natural gas production in Big Horn county in 2002 was 9,679,910 MCF (DNRC Annual Review 2002, Page 19), approximately 11 percent of total statewide production. Oil & Gas production taxes contributed less than one-tenth of one percent of County revenues in FY 1999 T Minerals Management Service report Big Horn County Federal gas production of 258,209 MCF in FY2001, latest data available, with royalty payments of $118,646.	No change from existing condition.	Based on the potential of future production; 2.1 BCF of CBNG would be produced having a gross value of $8,400,000 dollars over the life of 7 wells. The private lessees would receive $1,050,000 million dollars of royalties and pay $158,550 dollars in production taxes. The State would collect $781,200 dollars in production taxes. Drilling, production and abandonment of the 8 wells would provide jobs with an estimated income of $104,300 dollars over the life of the wells.	Based on the potential of future production; 4.2 BCF of CBNG would be produced, from the 14 wells, having a gross value of $16,800,000 over the life of the wells. The private lessees would receive $1,050,000 of royalties and pay $158,550 in production taxes. The Federal royalties would be $1,050,000. The State would collect $1,562,400 in production taxes, and receive 50 percent of the Federal royalties, $525,000. Drilling, production and abandonment of the 16 wells would provide jobs with an estimated income of $208,600 over the life of the wells.
Environmental Justice	In 2000, 24% of the population living in Big Horn County and 17% of the population in Rosebud County had incomes below the poverty level. These figures compare to a state figure of 13% and reflect the relatively large numbers of persons on the reservations living in poverty.	No effects	No effects	No effect

Affected Resource & Effect Indicators	Existing Resource Conditions	Alternative A – No Action	Alternative B – No Federal Action	Alternative C – Proposed Action
Soils:				
Approximate acres of Disturbance: Roads Well Pads (before/after reclamation) Corridors: Gas Flowlines Water Flowlines Electric Lines Water Treatment Facility	 0 acres 0 acres 0 acres 0 acres 0 acres 0 acres 0 acres	 0 acres 0 acres 0 acres 0 acres 0 acres 0 acres 0 acres	 .01 acres new road 4 acres/1 acre 1.6 acres 0 acres outside corridors .03 acres outside corridors 0 acres outside corridors 1.3 acres	 2 acres new road 8 acres/2.25 acres 5.6 acres 0 acres outside corridors .03 acres outside corridors 0 acres outside corridors 1.3 acres
Vegetative productivity on roads	800 lbs./acre for two-track roads 1400 lbs./acre undisturbed lands	800 lbs./acre for two-track roads 1400 lbs./acre undisturbed lands	100 lbs./acre for two-track roads 0 lbs./acre on improved roads	100 lbs./acre for two-track roads 0 lbs./acre on improved roads
Vegetation:				
Montana Plant Species of Concern	No known Montana Plant species of concern in the project area.	Same as existing conditions.	Not likely impacted by the project.	Same as Alternative B.
Wildlife:				
Habitat fragmentation and disturbance in project area	Project area is currently fragmented by a county gravel road, powerline, several two-track trails and a personal residence.	No change from existing situation.	Increased habitat fragmentation with the addition of well sites, access corridors, and increased human presence.	Same as Alternative B.
Electrocution hazard level	Existing Aerial powerlines pose electrocution hazard.	No change from existing situation.	Increased electrocution hazard from power drops to underground pwer infrastructure.	Same as Alternative B.

Affected Resource & Effect Indicators	Existing Resource Conditions	Alternative A – No Action	Alternative B – No Federal Action	Alternative C – Proposed Action
Proximity to T&E species habitat	Existing disturbance to bald eagle nesting and winter roost habitat from county road traffic and residences.	No change from existing situation.	Increased disturbance to bald eagle nesting and winter roost habitat with addition of CBNG infrastructure and increased human presence.	Same as Alternative B.